EXECUTIVE OVERVIEW

An interagency/stakeholder Diversion Effects on Fishery Populations Team (DEFPT) was formed to addressed the technical issues related to diversion impacts on fisheries for each the CALFED alternatives. The primary issues addressed were:

- Which species, populations, and life stages are most sensitive to diversion effects under no action and alternatives 1, 2, and 3?
- What degree of benefit and impact will the common programs provide?
- What is the risk and chances of success of species recovery for each alternative?

To evaluate these issues, species teams were formed for salmon, striped bass, and delta smelt. These species were chosen because they represent a range of exposure periods and they are the objects of numerous management and regulatory concerns. There are species that may be affected by changes in delta conditions whose responses may differ from the species analyzed here. The species teams developed matrixes on the effects of a set of impact parameters on the life stages of each species by month for each alternative. The detailed matrixes are described in individual species reports appended, which the reader is strongly urged to review for the details of the evaluations. This report summaries the process, assumptions, modeling studies, information used, professional judgement and the conclusions reached by the teams.

This report and the results should be interpreted cautiously, recognizing the many informational and procedural limitations inherent in these work products. The short time frame provided for this work compelled the team to rely primarily on professional judgement to evaluate the degree to which each relevant factor affects each of the key species. Assumptions had to made that in some cases limited the teams ability to answer the primary issues and included: 1) evaluation of diversion effects on fish populations was confined to the legally defined Delta, Suisun Bay and Suisun Marsh, even thought the CALFED solution area is much larger; 2) evaluations were based on a single operations study for each scenario with no attempt to minimize impacts or maximize benefits, (The next phase of the teams efforts will be to optimize the alternatives.), 3) the common programs will provide benefits with some negative impacts to each of the evaluated species, but the quantification of these benefits is uncertain, and 4) the impacts of water quality and exotics issues have not been evaluated.

The following were consensus professional judgements of the species teams, based on system operations modeling studies and published and unpublished information on individual species biology. Although the team had consensus on a number of assumptions regarding delta species biology, opinions of other scientists on the validity of the assumptions will likely vary from consensus to strong disagreement. The outcome of the assessments is very dependent on these assumptions.

The **salmon** team evaluated relative survival in the Delta of chinook salmon from the Sacramento and San Joaquin basins; Sacramento River races were assessed in aggregate. Survival was estimated monthly in relation to impact parameters considered important to salmon survival in the Delta. For Sacramento River chinook, five composite parameters had the greatest effects on survival; 1) entrainment losses, 2) flows below a Hood diversion, 3) interior-Delta survival, 4) habitat restoration, food supply, and screening of small agricultural diversions, and 5) impacts on adult upstream migration. Common Programs, Alternative 1, and Alternative 3 had similar total impacts, but involved different tradeoffs among benefits and detriments to salmon survival. Alternative 2 was least favorable, largely due to anticipated increases in adult straying and migration delays. For all three Alternatives, Common Programs provided most of the benefit. For San Joaquin salmon, the key composite parameters were 1) entrainment losses, 2) flow at Vernalis, 3) interior-Delta survival, and 4) habitat restoration, food supply, and screening of small agricultural diversions. Alternative 3 offers the greatest benefits for San Joaquin salmon, exceeding the benefits of any alternative for Sacramento salmon. Benefits accrue through reduced entrainment and improved interior-Delta survival.

The **striped bass** team concluded that none of the alternatives are likely to restore the adult population to historic levels (i.e., population of 1.8-3 million). Alternative 3 provides the best potential for partial restoration of the population. Alternative 3 is likely to reduce the entrainment of juveniles at the south Delta export facilities and increase the salvage of those that are entrained. Alternative 3 will likely enhance the transport of eggs and larvae in the lower San Joaquin River by positive flows and also restore Delta nursery habitat. However, both Alternatives 2 and 3 may have negative impacts by decreasing egg and larva transport below the Hood intake. Alternative 2 also has high impacts because of passage problems created for adult fish using the Mokelumne River as a migration route to Sacramento River spawning grounds. Alternative 2 also subjects eggs and larvae to two diversion points. Alternative 1 is likely to increase the entrainment of eggs and larvae at the south Delta export facilities. The common programs have both potential benefits and detriments that were difficult to quantify but are likely to have some net benefit.

The **delta smelt** team concluded that Alternative 3 has the most potential to improve conditions for delta smelt; however, the uncertainty associated with this evaluation is extremely high. The delta smelt team made separate evaluations for wet years and dry years. The No Action Alternative results in a slight worsening of conditions in both year types because of increased diversions to meet increased demand. The Common Programs result in a moderate improvement in conditions in both year types because of hypothesized benefits associated with increases in shallow-water habitat. Alternatives 1 and 2 represented moderate improvements compared to existing conditions but the benefits are derived from the Common Programs rather than changes in conveyance associated with the alternatives. Alternative 1 resulted in a slight decline in value in relation to the Common Programs. Alternative 2 resulted in a moderate decline in the value in relation to the Common Programs. The hydrodynamic effects of Alternative 2 were believed to

be a strong negative effect on delta smelt. Alternative 3 resulted in significant benefit to delta smelt because of the combination of the positive effects of the Common Programs and the Team's assessment that the hydrodynamic effects would also be positive for the majority of the population. The degree of benefit from the three Alternatives is very dependent on the Common Programs; thus, different assumptions about benefits of the Common Programs could result in substantially different assessments.